WAGE EARNINGS AND PRODUCTIVITY OF LABOR IN SELECTED INDUSTRIES OF ONTARIO: An Exploratory Survey

A. Ghebremichael

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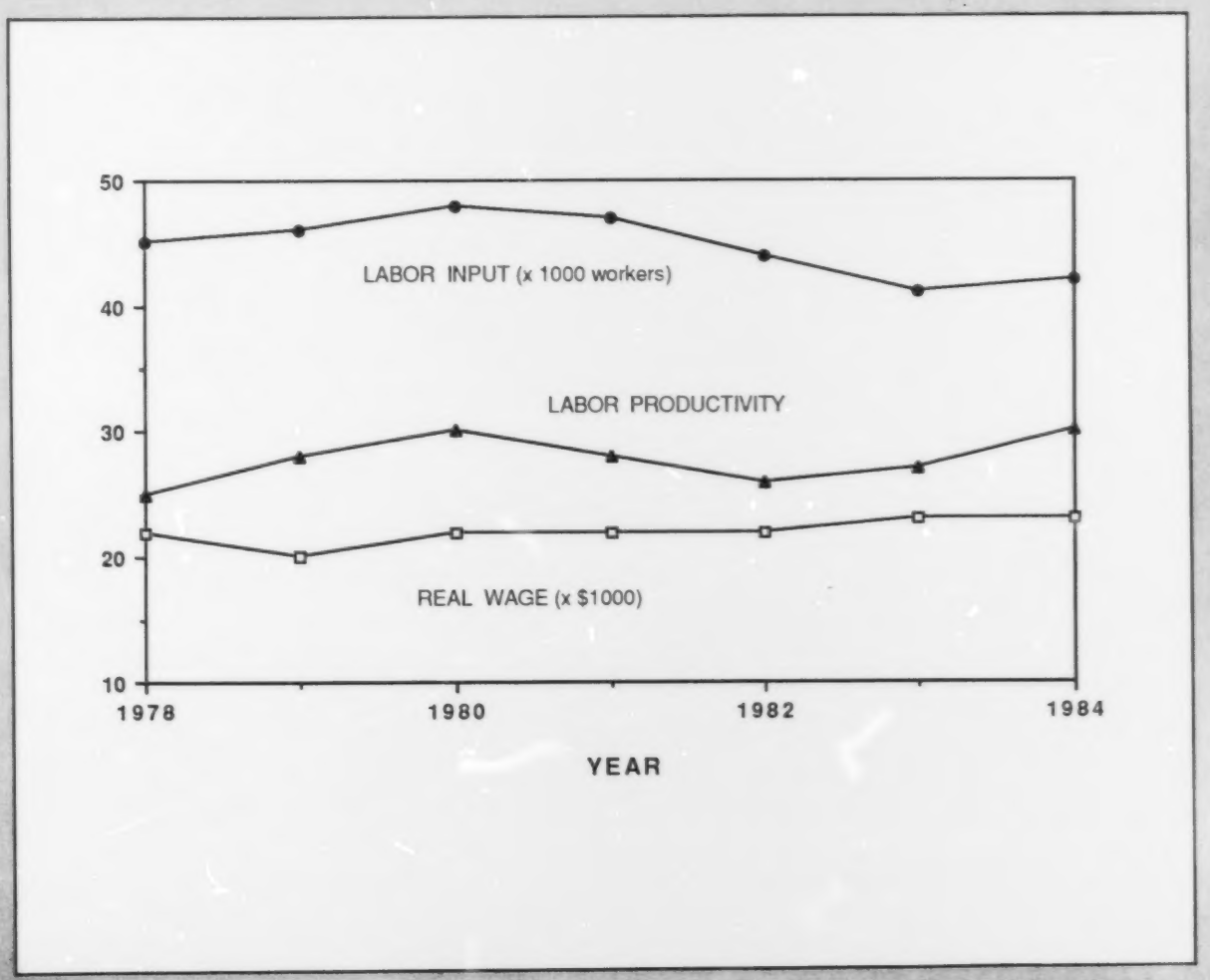

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An Exploratory Survey

A. GHEBREMICHAEL

FORESTRY CANADA

ONTARIO REGION

GREAT LAKES FORESTRY CENTRE

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ABSTRACT

This study is a comparative assessment among industries of employment (annual labor input), current- and constant-dollar wages paid, the share of labor in value added (defined as the ratio of total salaries plus wages to total value added), and labor productivity.

Six Ontario industries, as defined in the 1980 Standard Industrial Classification (SIC), were compared: Logging, Sawmills and Planing Mills, Paper and Allied Industries, Gold and Uranium Mines, Residential Construction, and All Hotels and Motels. The "All Manufacturing Industries" group was used as a benchmark. The main findings indicated: (i) unstable trends in labor input; (ii) a trend of increasing current-dollar wages, while wages either remained unchanged or declined in real terms; (iii) a greater share of labor in total value added in the forest products industries than in other industries; and (iv) although it was not consistent in all the industries examined, a tendency of labor productivity to vary with wage earnings in real dollars.

RÉSUMÉ

La présente étude est une évaluation comparative entre diverses industries de la main-d'oeuvre (facteur travail annuel), des traitements et salaires en dollars courants et constants payés, de la part de la main-d'oeuvre dans la valeur ajoutée (définie comme étant le rapport entre le total des traitements et salaires et le total de la valeur ajoutée) et la productivité de la main-d'oeuvre.

Les comparaisons portaient sur six industries de l'Ontario, telles que définies dans la Classification type des industries (CTI): Exploitation forestière, scieries et ateliers de rabotage, Industries du papier et des produits connexes, Mines d'or et d'uranium, Construction résidentielle et Hôtels et motels. Le groupe "Industries manufacturières" a été utilisé comme repère. Les principales constatations de l'étude indiquent (i) des tendances instables du facteur travail; (ii) une tendance à la hausse des traitements et salaires en dollars courants, bien que ceux-ci restent inchangés ou diminuent en dollars réels; (iii) une plus grande part de la main-d'oeuvre dans le total de la valeur ajoutée dans les industries des produits forestiers que dans les autres industries; et (iv) une tendance de la productivité de la main-d'oeuvre à varier selon les traitements et salaires en dollars réels, bien qu'elle n'ait pas été observée régulièrement dans toutes les industries observées.

TABLE OF CONTENTS

	Page
INTRODUCTION	1
ECONOMIC FUNCTIONS OF WAGES	1
Allocation of Labor Force	2
Stabilization and Growth	2
Efficient Utilization of Labor	2
Equitable Distribution of Income	2
Real Wages, Productivity, and International Trade	3
THE DATA BASE AND SELECTED INDUSTRIES	3
ANALYSIS AND RESULTS	4
Employment	4
Wages	4
Share of Labor in Value Added	6
ESTIMATING LABOR PRODUCTIVITY	10
Interpretation	10
Some Methods and Results	11
SUMMARY AND CONCLUSIONS	17
LITERATURE CITED	18

INTRODUCTION

Ontario's forest products industries play an important role in the provincial economy. In 1986, for example, 1,797 establishments employed 75,808 people and paid more than $2.2 billion in salaries and wages, and the total value added in that year amounted to nearly $4.34 billion (Anon. 1984a). The employment multiplier of the forest products industries in Ontario (i.e., the number of jobs generated in other sectors of the provincial economy per unit of employment created in the forest products industries) was estimated to be 1.10 for 1979; e.g., total employment in forest products industries was 71,356 in 1984, and this implies 1.1 x 71,356 = 78,492 additional jobs in other sectors (see Table 5 in Jacques 1988).

The objective of this report is to assess the trends in four economic variables related to labor: (i) employment, (ii) wages[1], (iii) the share of labor in value added (i.e., the ratio of total salaries and wages to total value added), and (iv) labor productivity. On the basis of the behavior of these variables, six industries selected from the Statistics Canada 1980 Standard Industrial Classification (SIC) are compared and assessed: three major forest products industries--Logging (SIC 041), Sawmills and Planing Mills (SIC 2512), and Paper and Allied Industries (SIC 27)--and three other industries--Gold and Uranium Mines (SIC 061 and 0617), All Hotels and Motels (SIC 911), and Residential Construction (SIC 401). The "All Manufacturing Industries group" (Division D) was also selected so that overall industrial-sector trends in the selected variables could be observed. In the selection of these candidate industries, an attempt was made to spread the sampling across the industrial and service sectors of the provincial economy.

The report is organized as follows: first, the major economic functions of wages are highlighted; second, the data base used is described; third, the trends in employment, wages and the share of labor in value added are examined; fourth, an overview of the techniques used to estimate labor productivity is given, and is followed by a discussion of the results of the estimate; finally, the results are summarized and conclusions are reached.

ECONOMIC FUNCTIONS OF WAGES

In a free and competitive market, wages are of great importance not only because they are the principal payments for services rendered and the main sources of income, but also because they play a major role in the allocation and utilization of labor. At the same time, wages maintain the purchasing power of consumers. However, the purchasing power of consumers should be balanced with the output of goods and services; if output exceeds the purchasing power of consumers, the effect is deflationary, whereas inflation results when purchasing power exceeds output. Five major economic functions of wages are described briefly in the following sections.

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[1] For the purpose of this study, wages are defined as the total annual salaries and wages paid divided by the number of workers in all categories of activity (production, management and administration).

Allocation of the Labor Force

Wages are the main motive force behind the distribution of labor throughout an economy. They stimulate mobility of labor from region to region and/or from industry to industry. For example, Fine (1988) reported that in fiscal 1986/1987, 120,000 people moved to Ontario from other provinces, while about 75,000 left the province, a net gain of 45,000 for Ontario. This interprovincial migration of labor was believed to be largely a result of promised jobs, higher wages, transfers and a search for employment.

For the past 4 years, the booming economy of Ontario has attracted both labor and business. Despite this very favorable economic climate, however, various reports show that Ontario still faced acute shortages of skilled labor in a number of key sectors of the economy. Gilhula (1988) provided a detailed assessment of some of the important sectors in which a shortage of skilled labor had a strong negative impact on regional economic growth. Citing Sault Ste. Marie as an example, he reported that it was difficult if not impossible to hire tradesmen, such as bricklayers and drywall applicators, in northern Ontario. As a result of this and other related factors (e.g., interest rates and general economic conditions), housing starts were reduced, despite the high general unemployment rate in the north during the 1987/1988 fiscal year. The author stated further that the mining industry based in northern Ontario was faced with a shortage of technicians and engineers. Hence, economic growth in remote and less developed regions is, to a large degree, a function of the amount of skilled labor that can be attracted by wages.

Stabilization and Growth

Wages have a significant impact on economic stabilization and growth. There is always a need to balance income with production. Since wages account for a major share of disposable personal income, they play a crucial role in balancing aggregate supply of and demand for goods and services. If output increases without a corresponding rate of increase in wages, the result may be deflationary. On the other hand, rapid increases in aggregate wages, at a rate that exceeds that of aggregate output value, leads to inflation. Thus, wage rates that take into account the aggregate supply of and demand for goods and services play a very important role in economic stabilization and growth.

Efficient Utilization of Labor

A desire to minimize total labor cost forces employers to make the best possible use of their human resources. Employees, on the other hand, apply their best efforts to being productive only if there are wage incentives for them to do so. That is, employers and employees can be motivated toward the best possible allocation of human resources by a proper labor-pricing system.

Equitable Distribution of Income

In a competitive market system, employers are compelled by market forces to pay competitive wages. In effect, wages play an important role in the distribution of income and purchasing power.

Real Wages, Productivity, and International Trade

In broader terms, patterns of changes in real wages reflect changes in labor productivity. Improved real-wage earnings imply an improvement in productivity. Wage rates, which comprise a major share of input costs, and improvements in productivity play a very important role in strengthening the competitive position of an industry in both domestic and international marketplaces.

THE DATA BASE AND SELECTED INDUSTRIES

The data base used in the present report consists of annual observations over the period 1978-1984. The following two categories of variables are included:

(1) Variables from all activities (production and management):
   (a) number of employees
   (b) wages and salaries
   (c) total value added

(2) Variables from production and related activities (excluding management and administration):

   (a) person-hours paid
   (b) value added

On the basis of the 1980 Standard Industrial Classification, two categories of industries and the "All Manufacturing Industries" group were selected. The first category includes three forest products industries: (i) Logging, (ii) Sawmills and Planing Mills, and (iii) Paper and Allied Industries. The second category comprises three other industries: (i) Gold and Uranium Mines, (ii) All Hotels and Motels, and (iii) Residential Construction. In the selection of these industries an attempt was made to spread the sampling over the industrial and service sectors of the provincial economy.

The data for the forest products industries were extracted from *Selected Forestry Statistics, Ontario: 1987* (Smyth and Campbell 1987). The following Statistics Canada catalogues were used as sources of information for the other industries:

All Manufacturing Industries (Anon. 1985a)
Residential General Building Contracting (Anon. 1985b)
All Hotels and Motels (Anon. 1984b)
Gold and Uranium Mines (Anon. 1977)

Data on wages paid, as provided by Statistics Canada, do not include supplementary income of labor (the employer's contribution to health and welfare plans, pension plans, workers' compensation and unemployment insurance) at the provincial or regional level. Consequently, supplementary incomes are not included in the analysis. However, this deficiency is deemed to have had no significant impact on the overall outcome of the study.

ANALYSIS AND RESULTS

In this section, the annual trends in employment, wages, and labor's share in value added are analyzed. Starting with employment, the annual levels of and percentage changes in these variables are reported in Tables 1 to 3.

Employment

Table 1 summarizes the levels of and percentage changes in employment.

Although the pattern differed among industries, marked variations in annual employment took place in all the industries under review (Fig. 1). The data in Table 1 reveal that the Logging and the Sawmills and Planing Mills industries continued to reduce their labor input (i.e., employment) from 1980 to 1982, a time when the Canadian economy was moving towards a recessionary period. During this 3-year period, employment in the Logging Industry declined by approximately 1.1% (1980), 6.0% (1981), and 21.4% (1982). In the Sawmills and Planing Mills Industry the annual declines amounted to 1.9% (1980), 4.9% (1981), and 9.4% (1982). Similarly, in the Paper and Allied Industries group, employment declined in the early 1980s. Before the 1.7% recovery in 1984, labor input in this group of industries declined by 1.0% (1981), 7.3% (1982), and 6.4% (1983). By comparison, it is interesting to note that, of the other industries, only the Residential Construction Industry experienced a sustained 3-year downturn in employment: 10.4% in 1980, 24.0% in 1982, and 3.?% in 1983.

It appears that the 1982 recession precipitated reductions in employment levels across all the reviewed industries: 21.4% in Logging, 9.4% in Sawmills and Planing Mills, 7.3% in Paper and Allied Industries, 5.0% in Gold and Uranium Mines, 24.0% in Residential Construction, 5.4% in All Hotels and Motels, and 7.0% in the All Manufacturing Industries group.

Wages

Ostry and Zaidi (1975) reported that five basic factors are particularly important in explaining changes in current-dollar wages in Canadian industries. They are (i) the level of unemployment; (ii) the relationship between wages in the industry under review and general wage levels in Canada; (iii) the relationship between wages in the Canadian industry and in a similar American industry; (iv) profitability of the industry; and (v) the demand for labor in the industry, as derived from the demand for its product. Real wages represent the purchasing power of current-dollar earnings, and are influenced by the general price level of goods and services. Table 2 presents current- and real-dollar annual wages and their percentage changes. This information is also provided in Figures 2 and 3.

Table 1. Annual employment and percentage changes for selected industries in Ontario, 1978-1984.

Industry[a]	Year						
	1978	1979	1980	1981	1982	1983	1984
LOGGING							
Employment	9 569	9 684	9 578	9 003	7 079	7 826	9 515
Change (%)	-	1.20	-1.09	-6.00	-21.37	10.55	21.58
SAWMILLS AND PLANING MILLS							
Employment	6 888	7 105	6 967	6 630	6 005	6 433	6 886
Change (%)	-	3.15	-1.94	-4.84	-9.43	7.13	7.04
PAPER AND ALLIED INDUSTRIES							
Employment	45 209	46 127	47 861	47 381	43 917	41 001	41 690
Change (%)	-	2.13	3.66	-1.00	-7.31	-6.64	1.64
GOLD AND URANIUM MINES							
Employment	6 909	7 667	8 34	8 875	8 463	8 484	9 012
Change (%)	-	10.97	8.78	6.41	-4.64	0.25	6.22
RESIDENTIAL CONSTRUCTION							
Employment	4 515	3 857	3 457	4 549	3 458	3 345	4 412
Change (%)	-	-14.57	-10.37	31.59	-23.98	-3.27	31.90
ALL HOTELS AND MOTELS							
Employment	35 024	33 112	33 770	34 232	32 394	32 457	30 153
Change (%)	-	-5.46	1.99	1.37	-5.37	0.20	-7.10
ALL MANUFACTURING INDUSTRIES							
Employment	880 776	913 612	909 991	912 060	848 971	846 683	838 673
Change (%)	-	3.73	-0.40	0.23	-6.92	-0.27	-0.95

[a] Change (%) represents the change in relation to the previous year's level.

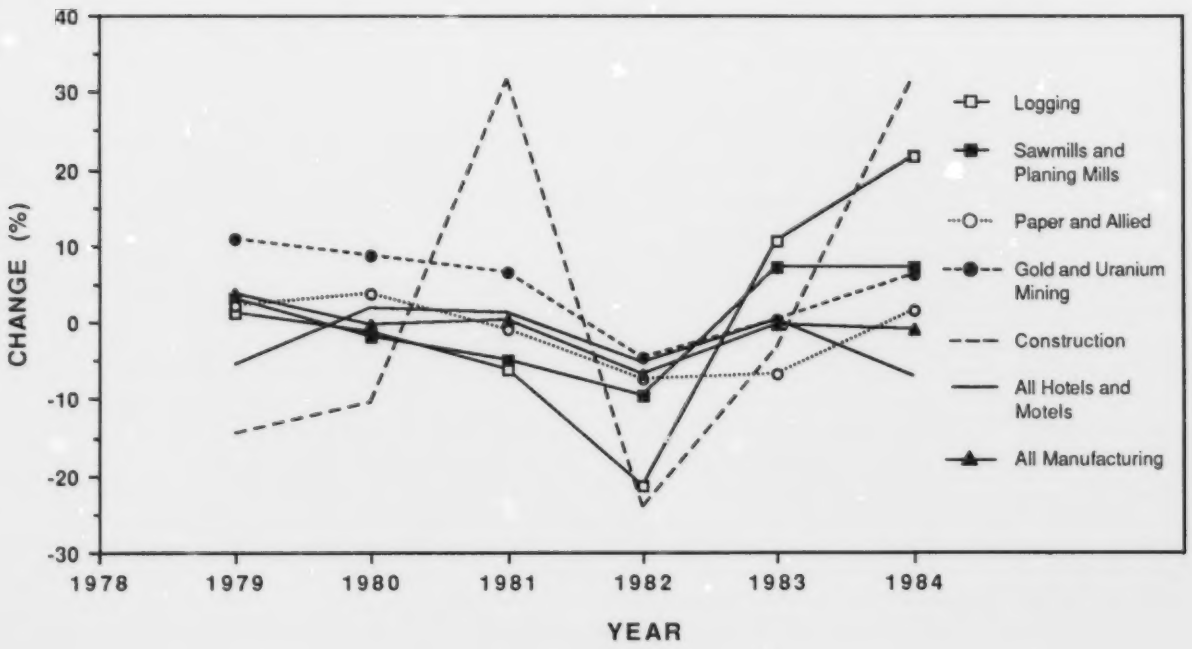

Figure 1. Trends in employment for selected industries in Ontario, 1978-1984.

Current-dollar wages tended to increase in all the industries over the period surveyed (Fig. 2). In real terms, however, wages either tended to remain unchanged or declined (Fig. 3). In the Logging Industry, for example, current-dollar wages increased by 7.1%, from $25,553 in 1981 to $27,376 in 1982, while in real terms there was a decline of nearly 3.0% (from $25,553 in 1981 to $24,887 in 1982). Similar trends are revealed in the other industries (Fig. 2 and 3).

The trends illustrated in Figures 2 and 3 appear to support most of the arguments reported in the news media during this period. Stinson (1988), for example, reported that real wages have shown a steady decline in Canada since 1976.

Share of Labor in Value Added

Value added is commonly defined as the difference between the value of goods and the cost of the materials and supplies used in production. In other words, **value added is derived by subtracting the cost of raw materials, parts, supplies, fuel, goods purchased for resale, electricity, and contract work expenditures from the value of shipments**. Value added is the best monetary gauge of the relative economic importance of a manufacturing industry, since it directly measures that industry's contribution to the economy (Greenwald 1973). When output is measured in terms of value added, labor costs constitute roughly 70% of the total cost of production (Berndt and Watkins 1981).

Table 2. Annual wages[a] and percentage changes for selected industries in Ontario, 1978-1984.

Industry	Year						
	1978	1979	1980	1981	1982	1983	1984
LOGGING							
Current ($)	18 790	20 371	22 515	25 553	27 376	29 108	28 987
Change (%)	-	8.42	10.52	13.49	7.14	6.32	-0.42
Real ($)	25 391	22 889	25 298	25 553	24 887	24 878	23 760
Change (%)	-	-9.85	10.52	1.01	-2.60	-0.04	-4.50
SAWMILLS AND PLANING MILLS							
Current ($)	13 794	15 159	16 965	18 637	18 860	20 523	21 466
Change (%)	-	9.89	11.91	9.86	1.20	8.81	4.60
Real ($)	18 641	17 032	19 061	18 637	17 146	17 541	17 595
Change (%)	-	-8.63	11.91	-2.22	-8.00	2.30	0.31
PAPER AND ALLIED INDUSTRIES							
Current ($)	16 532	17 913	19 364	22 051	24 567	27 085	28 333
Change (%)	-	8.36	8.10	13.88	11.41	10.25	4.61
Real ($)	22 341	20 128	21 757	22 051	22 334	23 150	23 224
Change (%)	-	-9.91	8.10	1.35	1.28	3.65	0.32
GOLD AND URANIUM MINES							
Current ($)	16 870	19 438	22 772	26 763	32 470	32 598	35 432
Change (%)	-	15.22	17.15	17.53	21.32	0.40	8.69
Real ($)	22 797	21 840	25 586	26 763	29 518	27 862	29 043
Change (%)	-	-4.20	17.15	4.60	10.29	-5.61	4.24
RESIDENTIAL CONSTRUCTION							
Current ($)	37 076	42 287	45 878	48 450	56 969	54 320	56 754
Change (%)	-	14.05	9.49	5.61	17.58	-4.65	4.48
Real ($)	50 103	47 513	51 548	48 450	51 790	46 427	46 520
Change (%)	-	-5.17	8.49	-6.01	6.89	-10.36	0.20
ALL HOTELS AND MOTELS							
Current ($)	8 026	8 957	9 654	10 610	11 635	12 333	14 539
Change (%)	-	11.61	7.77	9.91	9.66	6.00	17.89
Real ($)	10 846	10 065	10 847	10 610	10 577	10 541	11 917
Change (%)	-	-7.20	7.77	-2.18	-0.31	-0.34	13.05
ALL MANUFACTURING INDUSTRIES							
Current ($)	15 179	16 528	18 083	20 251	22 341	22 375	24 179
Change (%)	-	8.89	9.41	11.99	10.32	0.15	8.06
Real ($)	20 512	18 571	20 818	20 251	20 310	19 124	19 819
Change (%)	-	-9.46	9.41	-0.33	0.29	-5.84	3.63

[a] The general consumer price index (CPI) was used to express current-dollar wages in real terms.

[b] Change (%) represents the change in relation to the previous year's level.

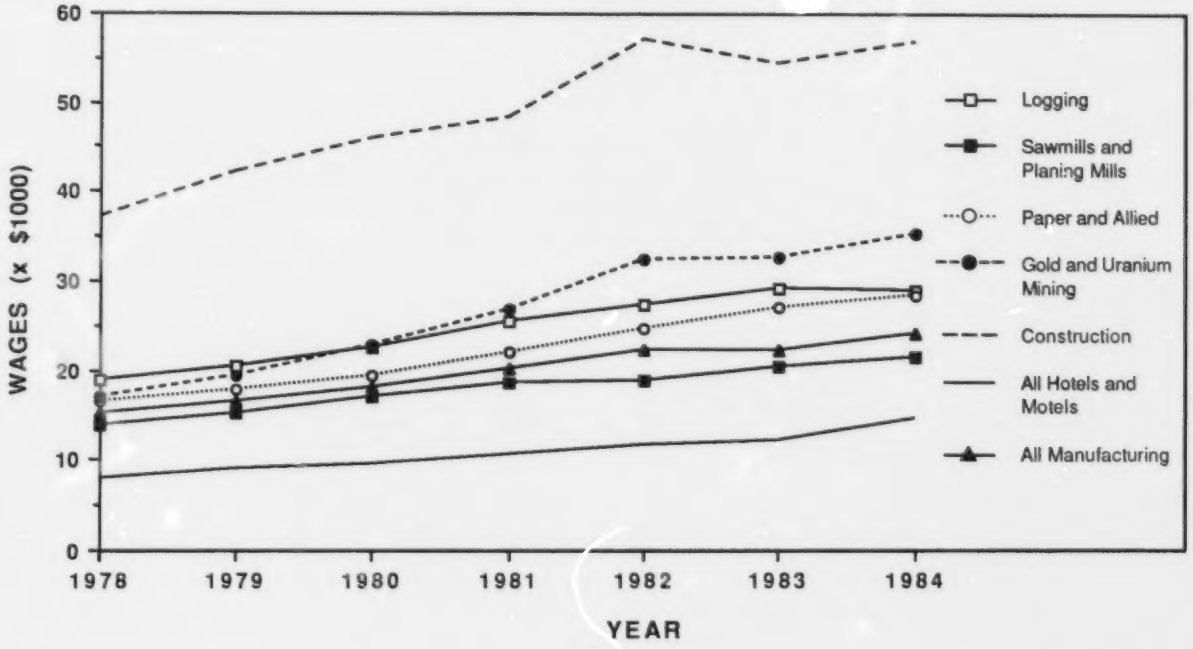

Figure 2. Trends in current-dollar wages for selected industries in Ontario, 1978-1984.

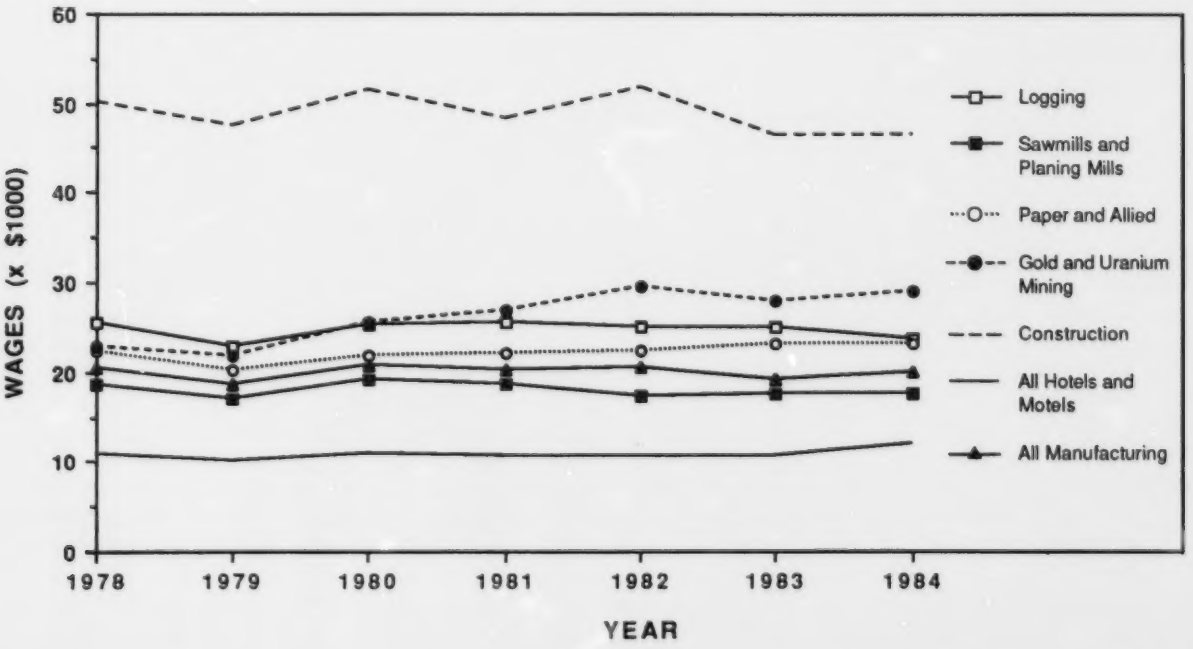

Figure 3. Trends in real wages for selected industries in Ontario, 1978-1984.

In this study, labor's share in value added, defined as the ratio of total payroll (salaries and wages) to total value added, has been computed so that relative shares can be compared for each industry. The percentages of annual shares of labor in total value added are summarized in Table 3 and illustrated in Figure 4.

Labor's share in value added is higher for all three forest products industries than for any of the other industries (Table 3 and Fig. 4). From 1978 to 1984, these values ranged between 64 and 71% for the Logging Industry, between 44 and 70% for the Sawmills and Planing Mills Industry, and between 47 and 57% for the Paper and Allied Industries group. Similarly, in the other industries, labor's share in value added fluctuated between 28 and 45% for the Gold and Uranium Mines Industry, between 9 and 12% for the Residential Construction Industry, and between 46 and 50% for the All Manufacturing Industries group.

It appears that these values reflect the characteristics of production processes and the values of final products of each industry. For example, consider the Logging Industry. In addition to the fact that roundwood is a low-value product, logging is more labor intensive than the other industries. Hence, the considerably higher share of labor in value added indicates the production process in the logging industry and the low level of value added associated with production.

Table 3. Percentage of annual share of labor in total value added for selected industries in Ontario, 1978-1984.

	Year						
Industry	1978	1979	1980	1981	1982	1983	1984
Logging	71	71	67	70	67	64	70
Sawmills and planing mills	48	44	59	62	70	56	61
Paper and allied industries	57	50	47	49	56	55	48
Gold and uranium mines	31	31	28	37	42	40	45
Residential construction	9	11	11	12	10	10	11
All manufacturing industries	48	46	47	46	50	50	47

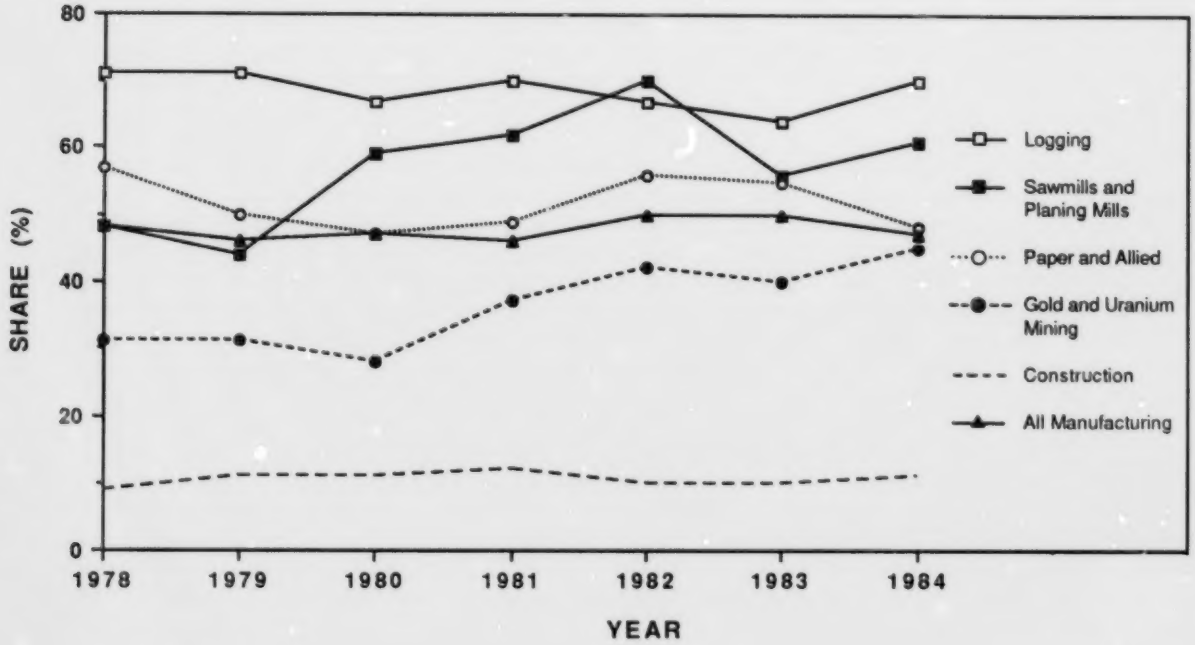

Figure 4. The share of labor in value added for selected industries in Ontario, 1978-1984.

Although it may not be an important issue in Ontario, as it was in British Columbia in the early 1980s, the usual argument against exporting lower-value-added primary products (e.g., logs) is based mainly on the notion that doing so results in exporting employment.

ESTIMATING LABOR PRODUCTIVITY

Economic theory suggests that real wage earnings and labor productivity are directly related (i.e., that increases in real wages follow corresponding rises in productivity). Labor productivity gains and redistribution of the relative values of the inputs that determine real output value are viewed as two of the primary factors justifying an increase in real wages. However, Berndt and Watkins (1981) and others suggest that productivity has overwhelmingly greater importance than redistribution of output value. The relationship between real wages and labor productivity is examined briefly below.

Interpretation

It is common to hear makers of public policy, business managers, labor unions, and members of the news media emphasize the productivity of labor. One reason is that, during collective bargaining, management and labor unions

often base their arguments with respect to wage-rate increases on labor productivity. In other words, labor productivity plays a role in management/labor relationships.

Changes in labor productivity are major factors in determining whether or not there is cost inflation associated with the production process. When productivity gains are translated into wage increments, growth in labor productivity plays a vital role in improving the living standards of workers. In the absence of labor-productivity gains, any increase in wages inflates the unit labor cost and leads to increases in output prices. This tends to nullify the wage increases. Economists commonly emphasize that increases in monetary compensation, whether in terms of wage increases or in terms of increases in supplementary benefits, will not result in increases in real compensation in the absence of productivity growth.

Some Methods and Results

Various approaches are used to measure the productivity of labor. In his study of 35 Canadian industries, Rao (1978, 1979) defined productivity as (a) real value added and (b) gross output, both per person-hour paid. Dempsey (1987) described labor productivity as output divided by all employee-hours worked. In an assessment (Anon. 1981) of the forest sector's contribution to the provincial economy, the Ontario Ministry of Natural Resources defined labor productivity in the woodlands operations as cunits of wood produced per person-hour paid. The International Woodworkers of America[2] compared annual labor productivity levels in American and Canadian softwood lumber industries by means of three approaches: (a) output per employee, (b) output per employee-hour paid, and (c) output per employee-hour worked. The American Bureau of Labor Statistics (Anon. 1987) reported productivity indices, measured in terms of physical output per employee, for three categories of labor: (a) all employees, (b) production workers, and (c) nonproduction workers.

In general, either **physical output** or **real value added per person-hour paid** has been used extensively. In the present study, the latter approach has been used. With the exception of the All Hotels and Motels Industry, for which data on value added were not available, labor productivity results are reported in Table 4 and illustrated in Figure 5.

The productivity of labor varies considerably from industry to industry (Table 4, Fig. 5). Labor productivity varies between 41.0 and 58.0 and appears to be higher in the Gold and Uranium Mines Industry than in all of the other industries. However, it can be inferred that these results may be a result of the fact that labor was being replaced by capital (i.e., automation and mechanization) in this industry. In addition, it is possible that substitution of capital for labor has taken place in all the industries under review as a result of increases in the relative price of labor. For example, in the

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[2] Anon. 1985. Productivity and unit production costs in the softwood lumber industries of the United States and Canada, 1978 to 1984. International Woodworkers of America. 93 p. (unpubl.).

Table 4. Labor productivity levels[a] and percentage changes for selected industries in Ontario, 1978-1984.

Industry	Labor productivity levels and changes[a]						
	1978	1979	1980	1981	1982	1983	1984
LOGGING							
Productivity	20.7	20.9	21.6	21.9	22.9	22.5	18.7
Change (%)	-	0.97	3.35	1.39	4.57	-1.75	-12.44
SAWMILLS AND PLANING MILLS							
Productivity	21.8	23.4	17.5	16.5	14.7	17.8	17.0
Change (%)	-	7.34	-25.21	-5.71	-10.91	21.09	-4.49
PAPER AND ALLIED INDUSTRIES							
Productivity	24.8	27.7	29.5	28.4	25.8	26.5	30.6
Change (%)	-	11.69	6.50	-3.73	-9.15	2.71	15.47
GOLD AND URANIUM MINES							
Productivity	47.9	50.7	57.8	48.0	45.2	45.2	41.0
Change (%)	-	5.85	14.00	-16.96	-5.83	0.00	-9.29
RESIDENTIAL CONSTRUCTION							
Productivity	25.7	25.6	25.6	25.4	19.7	21.0	20.7
Change (%)	-	-0.39	0.00	-0.78	-22.4	6.66	-1.43
ALL MANUFACTURING INDUSTRIES							
Productivity	28.4	29.4	29.2	29.8	28.4	30.2	31.3
Change (%)	-	3.52	-0.68	2.05	-4.70	6.34	3.64

[a] Labor productivity is defined as the real value added per person-hour paid; change (%) represents the change in relation to the previous year's level.

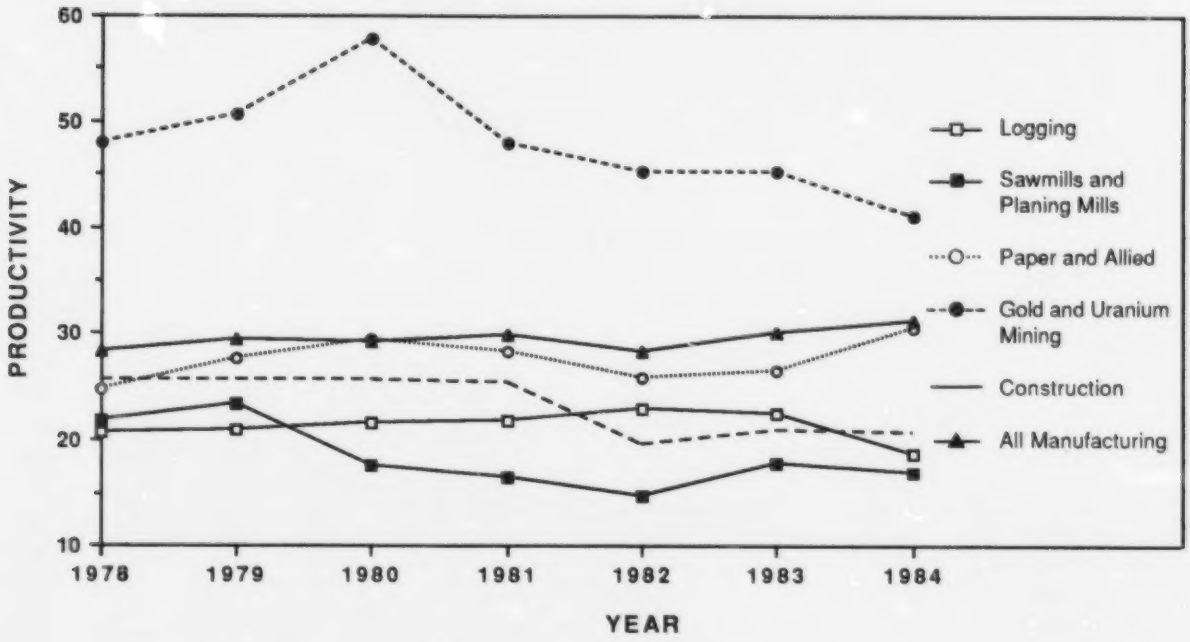

Figure 5. Labor productivity levels for selected industries in Ontario, 1978-1984.

Sawmills and Planing Mills Industry (often referred to simply as the Lumber Industry), Ghebremichael et al. (1990) reported that increases in the relative price of labor from 1962 to 1985 were dramatic in comparison with those for capital, energy, wood and other materials. This, among other factors, resulted in substitution of materials, energy and capital for labor.

In the forest products industries, labor productivity varies from 19.0 to 23.0 for the Logging Industry, from 15.0 to 23.4 for the Sawmills and Planing Mills Industry, and from 25.0 to 31.0 for the Paper and Allied Industries group. The productivity results for the Residential Construction Industry (which range from approximately 20.0 to 26.0) are not very different from those for the forest products industries.

Although the trend was not consistent across all the industries examined, labor productivity tended to vary directly with real wages (Fig. 6 to 10). In the Sawmills and Planing Mills Industry, for instance, real wages and productivity declined by 8.0 and 11.0%, respectively, in 1982 (Tables 2 and 4). Similarly, in the Residential Construction Industry, these variables decreased by 6.0 (real wages) and 0.8% (productivity) in 1981.

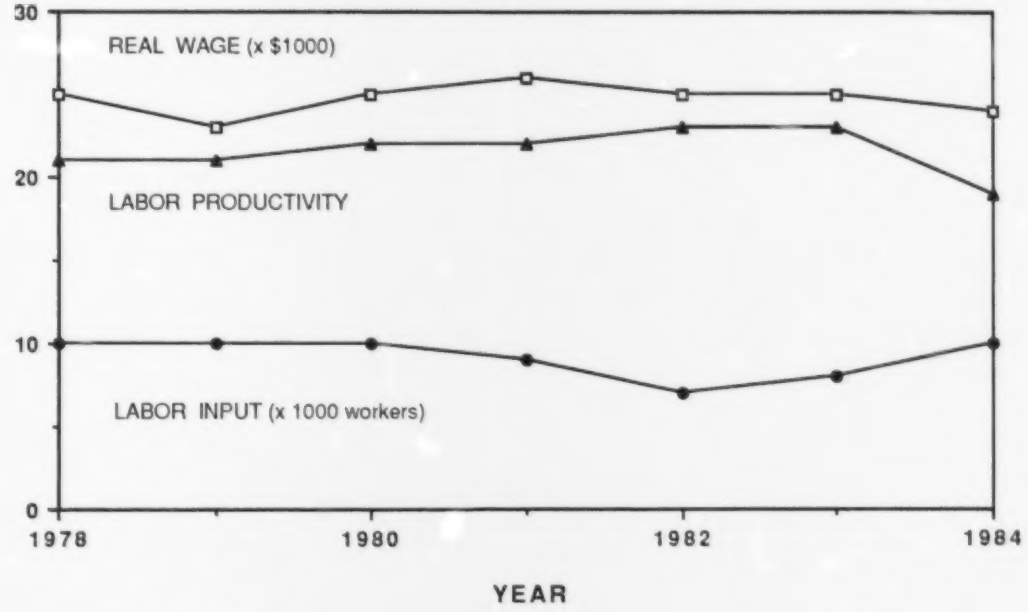

Figure 6. Real wages, productivity and input of labor for the Logging Industry in Ontario, 1978-1984.

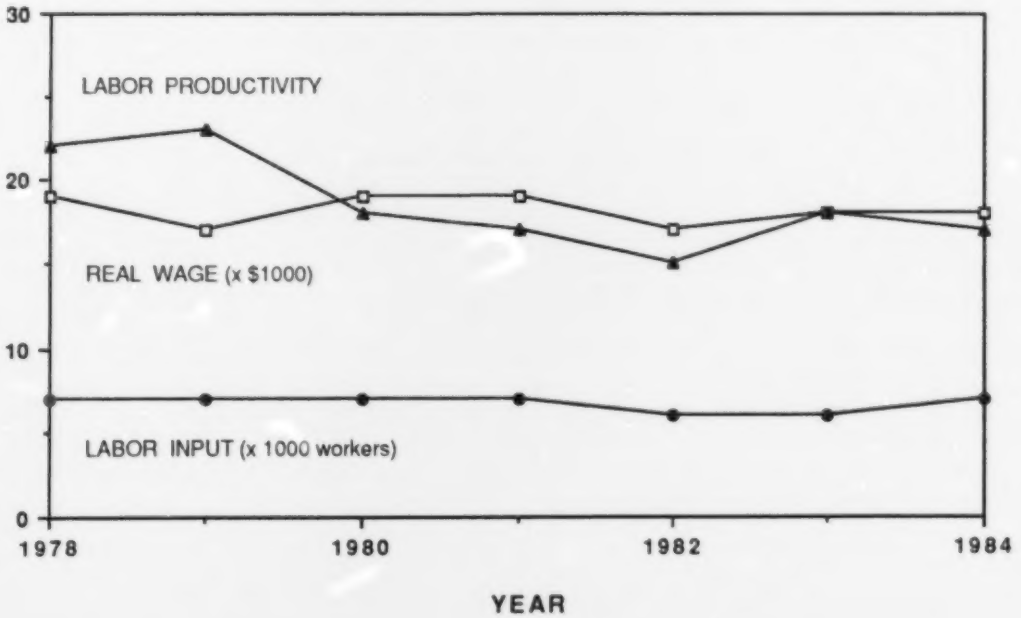

Figure 7. Real wages, productivity and input of labor for the Sawmills and Planing Mills Industry in Ontario, 1978-1984.

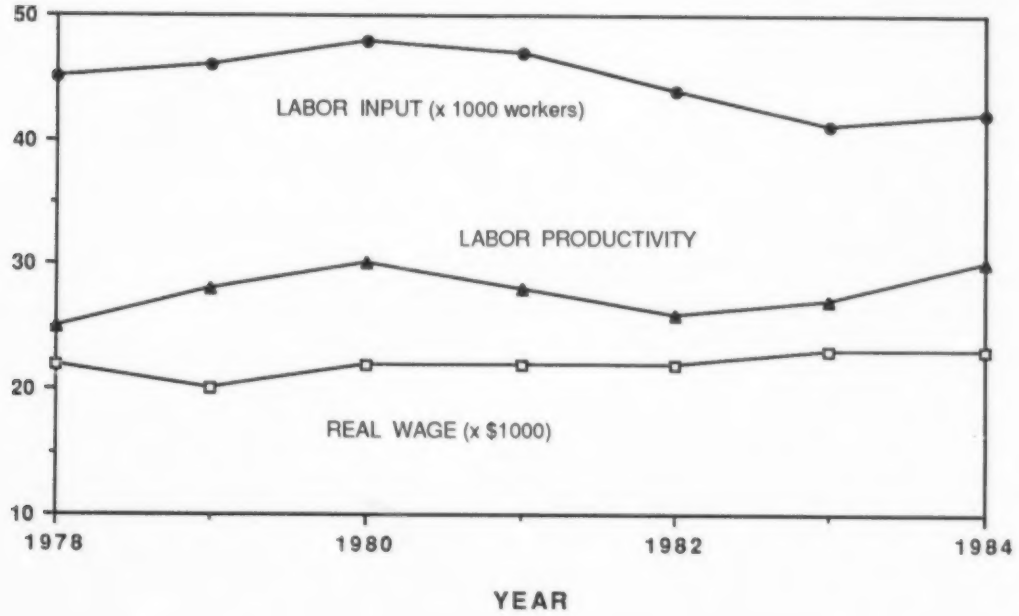

Figure 8. Real wages, productivity and input of labor for the Paper and Allied Industries group in Ontario, 1978-1984.

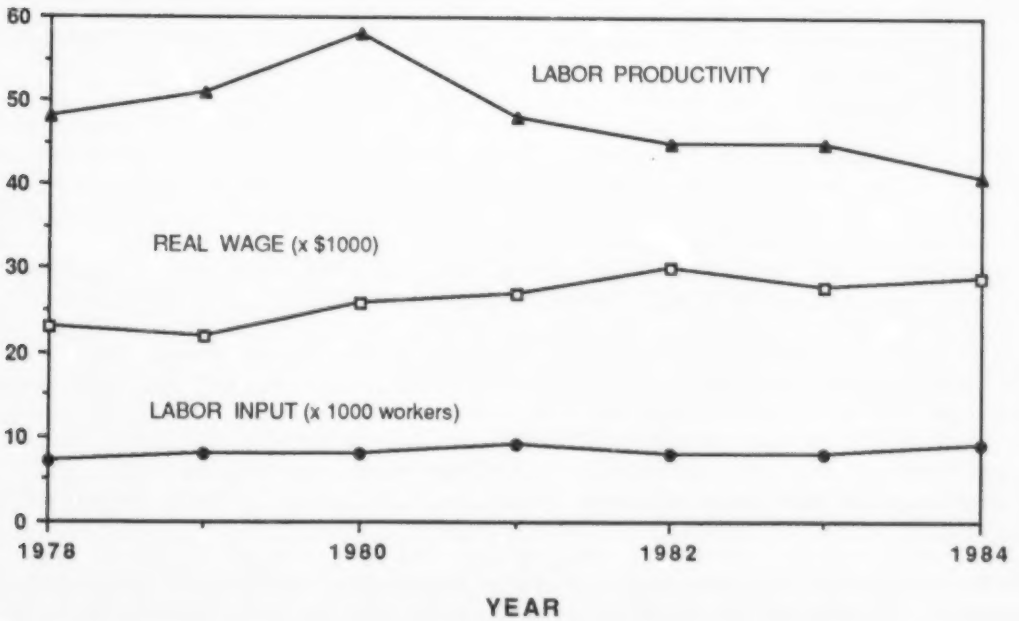

Figure 9. Real wages, productivity and input of labor for the Gold and Uranium Mines Industry in Ontario, 1978-1984.

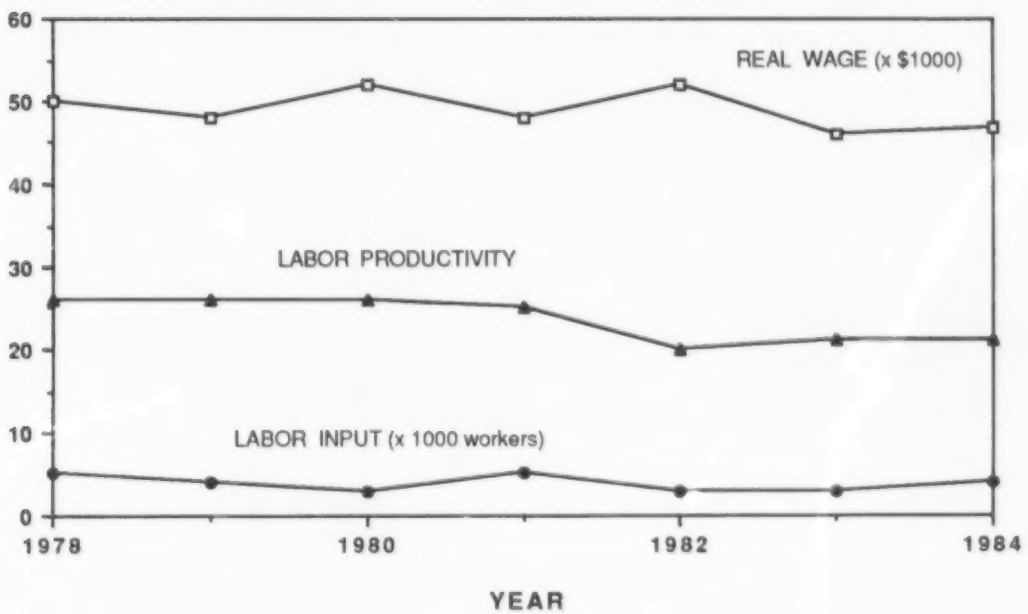

Figure 10. Real wages, productivity and input of labor for the Residential Construction Industry in Ontario, 1978-1984.

An increase in one input (e.g., labor) while other inputs are fixed results in a decline in the marginal productivity of that input. Some of the results of the present study may reflect characteristics of this behavior of a production function (technology).

Although it is not consistent among all the industries examined, there appears to be an inverse relationship between employment levels and labor productivity (Fig. 6, 7, 9 and 10). In the Sawmills and Planing Mills Industry, for example, employment rose by about 7.0% in 1984 (Table 1) while productivity declined by 4.5% (Table 4). During the same year, employment in the Gold and Uranium Mines Industry increased by 6.2% while productivity dropped by 9.3%.

It should be noted that causality analysis (empirical work) was not conducted in this study; one needs to specify an econometric model to conduct such analysis. Some results of the present approach, however, are worth noting. During the 1982 recession, both employment and productivity declined. The 1981 to 1982 declines in these factors (from Tables 1-4) are summarized in Table 5.

A comment on real wage earnings and the productivity of labor may be in order. Since the early 1970s, members of the news media and labor unions have claimed that labor productivity gains were far higher than real wage gains. Quoting a number of experts, Stinson (1988) reported that "Workers

have continued to suffer real losses, even with modest inflationary pressure. Since 1976, real wages have shown a steady decline while production has risen by 47%." However, the validity of such statements is questionable. Single-factor productivity gains, labor productivity in this case, cannot be credited to a single input. In fact, efficient utilization of a plant, an increase in capital investment, and technological advances are believed to be the major contributors to industrial productivity gains since 1980.

Table 5. Declines in employment and productivity for six industry groups in Ontario, 1981-1982.

Industry	1981-1982 Declines (%) in:	
	Employment	Productivity
Logging	21.4	4.6
Sawmills and Planing Mills	9.4	11.0
Paper and Allied Industries	7.3	9.2
Gold and Uranium Mines	4.6	6.0
Residential Construction	24.0	22.4
All Manufacturing Industries	7.0	5.0

SUMMARY AND CONCLUSIONS

In the preceding sections, an attempt has been made to address a wide range of issues with respect to employment, wage earnings and labor productivity. This section provides a summary and concluding highlights.

Wages, which represent compensation for labor services rendered, play a very important role in the efficient allocation and use of labor, in economic stabilization and growth, in the equitable distribution of income, and in assessment of the share of labor in value added.

Four main variables were used for the comparative assessment: (a) employment, (b) wages (expressed in current and real dollars), (c) share of labor in value added, and (d) labor productivity.

(i) Labor input (employment) in each of the reviewed industries tended to vary with the social, economic and technological conditions that prevailed during a given period. From 1978 to 1979, when the Canadian economy was in relatively good shape, employment increased by 1.20% in the Logging Industry, by 3.15% in the Sawmills and Planing Mills Industry, by 2.13% in the Paper and Allied Industries group, and by 3.73% in the All Manufacturing Industries group. However, during the same period, employment in the Residential Construction and the All Hotels and Motels Industries groups declined by 14.57 and 5.46%, respectively. This may be a result of technological progress (automation and mechanization) and other factors, e.g., an increase in the relative price of labor. By contrast, from 1981 to 1982, a recession-

ary period in Canada, employment declined in all the industries examined; these declines were 21.37% for the Logging Industry, 9.43% for the Sawmills and Planing Mills Industry, 7.31% for the Paper and Allied Industries group, 4.64% for the Gold and Uranium Industry, 24.00% for the Residential Construction Industry, 5.37% for the All Hotels and Motels Industry, and 7.00% for the All Manufacturing Industries group.

(ii) Annual current-dollar wages increased, although there were no significant variations in real terms over the period covered by this report (1978-1984). From 1978 to 1979, for instance, current wages increased by 8.42%, but real-dollar wages declined by about 10% in the Logging Industry; in the Gold and Uranium Mines Industry, there was a 15.22% increase in current-dollar wages but a 4.20% decline in real terms. Similar changes were observed in the other industries.

(iii) The share of labor in value added in all the forest products industries was higher than that in the other industries. These values varied, over the period 1978-1984, between 64 and 71% for the Logging Industry, between 44 and 70% for the Sawmills and Planing Mills Industry, and between 47 and 57% for the Paper and Allied Industries group. In the other industries, the labor shares ranged between 28 and 45% in the Gold and Uranium Mines Industry and between 9 and 12% in the Residential Construction Industry. In the All Manufacturing Industries group, values ranged from 46 to 50%.

(iv) In most cases, particularly in the forest products industries, labor productivity appeared to vary with real wages. In the Logging Industry, for example, labor productivity and real wages declined by 12.4 and 4.5%, respectively, from 1983 to 1984; in the Sawmills and Planing Mills Industry, these variables declined by 11.0 and 8.0%, respectively, from 1981 to 1982. Similar variations in the relationship between labor productivity and real wages were observed in the other industries.

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